

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Method for the Continuous Processing of Polyvinyl Halide Compositions

We, CHEMISCHE WERKE MÜNCHEN OTTO BARLOCHER G.m.b.H., a German Company, of 16 Riesstrasse, 8 Munich 54, Federal Republic of Germany, do hereby declare the

invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10. The plastics processing industry utilises a large number of processing agents as additives to the plastics base materials to be processed. Such additives include, for example, plasticisers, lubricants, mould parting agents, fillers, anti-static agents, ultra-violet absorbers, expanding agents, dyestuffs and fire retarding agents. Of particular importance for the processing of polyvinyl chloride are the pulverulent products utilised as stabilisers for suppressing or retarding the decomposition of polyvinyl chloride under the influence of heat or light. Suitable stabilisers are inorganic lead compounds such as neutral or basic lead carbonates, sulphates and phosphites; organic lead compounds such as neutral or basic lead stearates and lead palmitates; organo-lead compounds such as diphenyl lead diacetate; neutral or basic lead salts of aromatic or polybasic carboxylic acids, such as salicylates, phthalates and malates. Customary pulverulent metal soap stabilisers are cadmium soaps such as cadmium stearate and cadmium laurate, barium soaps, barium-cadmium soaps, calcium soaps, strontium soaps and zinc soaps. Rarely is one stabiliser used alone. It is usual to employ a plurality of stabilisers together, the properties of which complement one another. Similarly extensive conditions
40. apply in the cases of other processing additives, and especially lubricants and fillers.

According to current practice each of the various additives to be employed must be weighed separately and then homogeneously mixed with the base resin and the other additives, to obtain a dry blend of the constituents in the quantitative proportions desired for the processing of the blend to form the particular plastics articles of manufacture required. The probability of weighing errors and, consequently, of irregularity in the final product is the greater the larger the number of individual weighings required, quite apart from considerations of time and cost consumed thereby. In the case of poisonous stabilisers, such as lead soaps for example, their fine powder form makes special precautions against poisoning necessary. Another disadvantage of products in fine powder form is their defective ability to flow freely, which prohibits continuous and controlled feed from storage silos.

According to the practice in the art the processor of polyvinyl chloride must perform the weighing and the mixing, the latter in a high speed or low speed mixer, before the dry blend of the composition he requires can be introduced into the apparatus for processing it. The production of PVC dry blends is, therefore, effected discontinuously, in a batch process, the quantity of the blend in each batch depending upon and being limited by the size of mixer available. Besides this main disadvantage of lack of continuity, another disadvantage of the batch process is that in batch mixing it is generally first necessary to heat and then to cool again.

Various attempts have, therefore, been made to simplify the proportioning of the various additives, and it has already been attempted to produce dry blends con-

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tionously. Some improvement in this respect has been achieved with the aid of a drum disc extrusion mixer. However, this cannot be used for direct production of sections, tubes, plates, webs and injection

5 mouldings.

Elsewhere we have described wet and dry granulation processes whereby stabilisers, lubricants, fillers and other additives used in processing plastics, such as polyvinyl chloride in particular, can be produced in granular form and of controllable uniform grain size.

10 In contrast to the conventional pulverulent additives, such granular additives are free-flowing, do not form dust, and have a practically unlimited storage life, and accordingly are particularly suited for controlled continuous feeding from storage silos. Such free-flowing additives in granular form thus possess physical properties well suited to enable the continuous production of dry blends which are suitable for continuous processing in an extruder, injection moulding machine, calendar or any other plastics processing machine in which such dry blends can be used.

25 The present invention, therefore, consists in a method for the continuous processing of a plastics dry blend of polyvinyl halide base material with selected additives such as stabilisers, fillers and lubricants in predetermined proportions to form an article of manufacture therefrom, the method comprising the steps of feeding separate streams of particled polyvinyl halide base material and of free-flowing additives in granular form into mixing apparatus and continuously mixing said streams homogeneously in the mixing apparatus to form a dry blend of their constituents, while controlling the rates of feeds of the streams into the mixing apparatus in accordance with the predetermined proportioning of their constituents in the blend to be produced, continuously discharging a stream of the dry blend from the mixing apparatus and feeding the discharged stream of dry blend continuously into processing apparatus for transforming the received dry blend into the formed article.

30 The granular additives may be fed in one or more streams. A stream of additive may contain one additive alone or a plurality of additives mixed. In our patent specifications above mentioned we describe the production of granular additive compositions the granules of which are composed of a plurality of additives, or additives along with the same plastics base material, all incorporated together in a single uniform granular product. Thus, in practising the present invention and according to circumstances, such a product may be utilised and fed in a stream to supply some, if not all,

of the additives to be incorporated in the eventual dry blend. 65

By practice of the method of this invention with the aid of granular free-flowing additives the processing machine may be fed directly with the continuously produced dry blend. 70

In order that the invention may be more clearly understood, one preferred manner of carrying it into practice will now be described in the following example. For assisting the description, reference will be made to the accompanying diagrammatic drawing of an example of apparatus which may be used. The apparatus depicted is shown for the purpose of illustration only, and the invention is not intended in any way to be restricted thereto. 75 80

EXAMPLE

A PVC dry blend is produced with the aid of a uniform granular additive composition having the following constitution, by weight: 85

16.7% dibasic lead stearate
16.7% dibasic lead phosphite
6.6% neutral lead stearate
50.0% chalk
10.0% cetyl palmitate

Referring to the drawing, a stream of granules of the above composition is fed from a storage silo (not shown) by way of a vibrating chute 10a into the top of a mixing mill M. This mill has a water-cooled jacket 3 with stationary outer teeth 4 co-operating with teeth on a rotatable shaft 5; an internal cooling passage 6 in the shaft 5, a supply pipe 8 and a discharge pipe 9 for cooling liquid, connected to the shaft in communication with the passage 6, and seals 11 for the rotatable water connections on the shaft 5 to pipes 8 and 9. The shaft 5 is driven by a motor 7. 90 100 105

Simultaneously with the feeding of the stream from chute 10a, a stream of polyvinyl chloride is fed into the top of the mill M by way of a vibrating chute 10, and the polyvinyl chloride is homogeneously mixed with the granular additive composition comminuted in the mill as the materials pass down the mill. 110

A stream of dry blend thus produced issues from the bottom of the mill M and is fed directly into a processing machine, in this example depicted as an extruder E having a cylinder 1 and warrn 2 to which the issuing dry blend is fed. 115 120

The vibrating chutes 10a and 10 are adjusted to control the respective rates of feed so that the feed of the granular additive composition is 3% of that of the polyvinyl chloride, by weight. 125

WHAT WE CLAIM IS:—

1. Method for the continuous processing

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of a plastics dry blend of polyvinyl halide
base material with selected additives such as
stabilisers, fillers and lubricants in predeter-
mined proportions to form an article of
5 manufacture therefrom, the method compris-
ing the steps of feeding separate streams of
particled polyvinyl halide base material and
of free-flowing additives in granular form
into mixing apparatus and continuously mix-
10 ing said streams homogeneously in the mix-
ing apparatus to form a dry blend of their
constituents, while controlling the rates of
feeds of the streams into the mixing appara-
tus in accordance with the predetermined
15 proportioning of their constituents in the
blend to be produced, continuously discharg-

ing a stream of the dry blend from the mix-
ing apparatus and feeding the discharged
stream of dry blend continuously into pro-
cessing apparatus for transforming the re-
ceived dry blend into the formed article. 20

2. Method as claimed in claim 1, substan-
tially as hereinbefore described with re-
ference to the Example.

For the Applicants:
BERNIER & BURRINGTON
Chartered Patent Agents
Chancery House
53-64, Chancery Lane
London, W.C.2.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*